Course code		CLOUD COMPUTING METHODOLOGIES		L	T	P	J	C
CSI3001				3	0	2	0	4

Pre-requisite	Nil	Syllabus version v.1.0

Course Objectives:

1. To introduce the concept of Virtualization and cloud computing
2. To provide students a sound foundation of the Cloud Computing enabling them to start using and adopting Cloud Computing services and tools in their real life scenarios
3. To enable students explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

Expected Course Outcome:

1. Analyze and study the basics of cloud computing, cloud models and its applications
2. Appreciate the requirements of various service paradigms in Cloud Computing
3. Analyze, identify and select suitable type of virtualization
4. An ability to use techniques, tools, skills in a secured cloud environment
5. Design, implement and evaluate a cloud-based system, process, component, or program to meet desired needs

Module:1	Introduction	5 hours

Overview of Computing Paradigm, Cloud Computing- NIST Cloud Computing Reference

Architecture, Types of Cloud Deployment Models - Private, Public, Hybrid, Agency Clouds

Module:2	Cloud Service Models	5 hours

Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), Anything as a Service(XaaS)

Module:3	Virtualization	7 hours

Need for Virtualization – Pros and cons of Virtualization, Types - Implementation Levels – CPU, Memory, I/O Devices, Virtual Clusters and Resource management

Module:4	Cloud Environments	7 hours

Cloud Environments - Case study: One cloud service provider per service model (eg. Amazon EC2,

Google App Engine, Sales Force, Microsoft Azure, Open Source tools)		
Module:5	**Cloud Application Development**	**8 hours**
Cloud application development using third party APIs, Working with EC2 API – Google App Engine API - Facebook API, Twitter API , HDFS, Map Reduce Programming Model.		
Module:6	**Security**	**7 hours**
Cloud Security Challenges and Risks – Software-as-a- Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security		
Module:7	**Advances in Cloud**	**4 hours**
MQTT in Cloud, MQTT working example – Fog Computing basics – Comparing Cloud, Fog and Mist Computing		
Module:8	**Recent Trends**	**2 hours**
	Total Lecture hours:	**45 hours**	

Text Book(s)

1.	Rajkumar Buyya, James Broberg, Andrzej, M. Goscinski, Cloud Computing: Principles and Paradigms, 1st Edition, Wiley,2013
2.	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing: From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers,2013

Reference Books

1. Sehgal, Naresh, Bhatt, Pramod Chandra P., Acken, John M, "Cloud Computing with Security Concepts and Practices", 2nd Edition , Springer International Publishing, 2020
2. Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, "Mastering Cloud Computing" , 1st Edition, Tata McGraw Hill, 2017
3. Perry Lea, "IoT and Edge Computing for Architects: Implementing edge and IoT systems from sensors to clouds with communication systems, analytics, and security", 2nd Edition, Packt Publishing Limited, 2020

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

	List of Indicative Experiments	
1.	Virtual box based Webserver creation, Images/Snapshots access web page from 2nd VM on another subnetwork	2 hours
2.	EC2 AWS – S3 bucket based static webpages.	2 hours
3.	EC2 AWS – Instance Creation, Migration	2 hours
4.	EC2 AWS – Web application using Beanstalk	2 hours
5.	AWS – Local balancing and auto scaling.	3 hours
6.	IBM Blue Mix - Mobile Application development	3 hours
7.	DaaS – Deployment of a basic web app and add additional functionality(Javascripts based)	3 hours
8.	PaaS – IOT – Mobile sensor based IOT application hosted via PaaS environment	3 hours
9.	SaaS – Deployment of any SaaS application for a online Collaborative tool	3 hours
10.	Deployment of Open stack or Virtual box from the scratch	3 hours
11.	Hadoop as a Service	2 hours
12.	Cloud TM Online Collaboration Services (User Defined Applications)	2 hours
	Total Laboratory Hours	**30 hours**

Mode of assessment: CAT1/CAT2/FAT			
Recommended by Board of Studies	11-02-2021		
Approved by Academic Council	No. 61	Date	18-02-2021